Tips and Tricks for Practicing High-Quality Medicine on a Shoestring Budget

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Introduction

International animal welfare charities frequently face management dilemmas due to the large numbers of free-roaming and unowned animals that come through their doors. The World Health Organization estimates that there are more than 200 million free-roaming dogs worldwide. Unfortunately, stray animals can serve as competent reservoir hosts of several zoonotic pathogens and a multitude of infectious diseases due to a lack of preventive veterinary care. Veterinarians working with such animals may struggle with how to treat such dogs effectively with a limited operating budget. Effective use of resources and disease management strategies are especially vital when well-intentioned rescue groups plan to send stray dogs from developing countries into adoptive homes internationally. Commonly observed diseases internationally in free-roaming animals include:

- Skin disease (mange)
- Transmissible venereal tumor (TVT)
- Tick-borne disease (blood parasites)
- Infectious diseases (parvovirus, distemper)
- Trauma

General Tips and Tricks

- Don’t be afraid to ask for donations!
  - Contact hotels for used towels and bed sheets to use as patient bedding and for cleaning
  - Recently out-of-date medication
  - Surgical instruments
  - Manuka honey
- Ask for valuable items from donors who may have connections with local vet clinics
  - Convenia®, Bravecto®, Advocate/Advantage Multi, doxycycline, cephalexin, doramectin
- Invest in medications and supplies rather than supplements.
- Invest in a microscope.
- Have oxygen on-hand and make an oxygen hood using an e-collar.
- Use human pee pads instead of commercial ones specific for pets.
- Invest in bathroom and baby scales to monitor patient health.

Assess the Facility

- Can animals express normal behaviors?
- Is there overcrowding?
- Is there an area to isolate sick animals?
- What about the behavioral health of patients?
• Are there adequate elevated resting areas and feeding stations?

Set New Animals up for Success
At a minimum, all new animals entering a facility should receive the following:
• Rabies vaccine
• Modified-live DHPP or FVRCP vaccine
  o Ideally booster 2 weeks later!
• Endo and ectoparasiticide
• ID (microchip, identification band, etc)

Surgery and Anesthesia
• Don’t attempt surgery if the proper supplies (and training) are not in-hand
• Consider using suture on a cassette (reel) for significant cost savings
  o Chromic cat gut & vicryl are inexpensive, commonly used suture materials
• Consider investing in a gas anesthesia machine. Portable machines can be purchased for ~1500 USD.
• Syringes can be re-used if needles are changed. Be sure to label syringes.
• Don’t forget the value of local blocks for pain management! See attachment on performing local blocks.
• Invest in anesthetic monitoring equipment – Breath Safe monitors connect to the ET tube and cost around 180 USD.
• To sterilize instruments, use a pressure cooker or autoclave at local human hospital.
• Use corn oil for eye lubricant.

Specific Diseases

Wounds
Consider the use of Manuka honey on wounds for its antibacterial properties. Unlike antibiotics, honey can be readily donated by the public. Although Manuka has been the most studied honey to date, other types may have valuable antimicrobial properties. For antibiotic therapy, the use of Convenia, albeit expensive, can be a useful product in fractious/feral patients, or those that might only be seen once (patients in CVNR/TNR programs).

Tie-over bandages can be helpful for managing large wounds that are in places that are difficult to bandage using conventional bandaging methods. See handout below on how to place a tie-over bandage.

Wounds left exposed are frequently subject to maggot infestations. Commercially available products such as Negasant may be available depending on the geographical location. The author uses the following treatment protocol:

Sedate → Clip/clean → Apply larvicide → Clean, rinse, and repeat → Dress the wound → Start a course of oral or injectable antibiotics

Products used for extracting maggots
• Capstar: The oral tablet can be dissolved in water and dripped in the wound.
• D-Mag spray or Topicure spray: Anti-maggot sprays used extensively in India.
- Ivermectin: Some advocate using either crushed tablets dissolved in water or a dilution of the injectable product. Systemically administered ivermectin (0.2-0.4 mg/kg) may also kill maggots.
- Medicinal turpentine oil/Eucalyptus oil: Turpentine is an essential oil distilled from pine tree sap. Maggots will typically come out of a wound when turpentine oil soaked gauze is used to plug the wound. This is used commonly throughout the world.
- Negasunt powder (Bayer) or Gotbac powder (Scientific Remedies Pvt. Ltd.)
- Non-alcohol-based pyrethrin or pyrethroid in dogs.
- Spot-on application of Revolution® (selamectin) or Advantage Multi®/Advocate® (imidacloprid + moxidectin) may help kill maggots. This is an off-label use.
- Tincture iodine/ Povidone iodine (Betadine)

**Skin Disease (Mange)**

The incidence of skin disease in stray dogs is high. Aside from the obvious animal welfare issues associated with untreated skin disease, some causes may be contagious to other dogs and humans. Therefore, prompt and accurate diagnosis is important for proper management. Parasitic mites in particular are one of the most common causes of dermatopathies in stray dogs. The most important canine mange-mite infestations worldwide are Demodex canis (D. canis), Sarcoptes scabei var. canis and Otodectes cynotis.

Few diseases in veterinary medicine have the ability to conjure sympathy than the Demodex mite. While most Demodex spp. are considered normal mammalian fauna, mite overgrowth can be associated with hair loss and severe dermatitis. Pruritus can be seen with secondary bacterial pyoderma. Canine demodicosis can present as either a mild, localized form or moderate to severe generalized form. Stray dogs may be more prone to generalized demodicosis due to poor nutrition, excessive cortisone, and underlying disease states. Most cases of localized demodicosis resolve spontaneously, and treatment is unnecessary. For dogs with generalized demodicosis, extended and aggressive therapy is warranted. In the US, amitraz dips at 250ppm every 2 weeks is the only approved treatment for canine demodicosis. The use of a benzoyl peroxide shampoo is recommended prior to the application of amitraz. More commonly, daily oral ivermectin is used at escalating doses using 100 ug/kg increments.

**Ivermectin dosing chart**

<table>
<thead>
<tr>
<th>Day of Treatment</th>
<th>Dose (μg/kg PO q24h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>2-3</td>
<td>100</td>
</tr>
<tr>
<td>4-6</td>
<td>150</td>
</tr>
<tr>
<td>7-9</td>
<td>200</td>
</tr>
<tr>
<td>10-16</td>
<td>300</td>
</tr>
<tr>
<td>17+</td>
<td>400</td>
</tr>
</tbody>
</table>

Micrograms of ivermectin (1%) per ml

<table>
<thead>
<tr>
<th>Each ml of large animal ivermectin (1%) solution contains 10 mg/ml of ivermectin.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therefore, 0.1 cc = 1,000 μg</td>
</tr>
</tbody>
</table>

A sample calculation using large animal ivermectin (1%) is included below.
A 20 kg dog requires an ivermectin dose of 300 μg/kg

First determine the dose in μg,

\[ 20 \text{ kg} \times 300 \mu \text{g/kg} = 6,000 \mu \text{g ivermectin} \]

Then determine the dose in cc’s assuming a 1% solution is used:

\[ \text{A 1% ivermectin solution has 10,000 μg per cc} \]

\[ 6,000 \mu \text{g}/10,000 \mu \text{g} = 0.6 \text{ cc ivermectin} \]

Alternatively, doramectin can be administered once weekly at a dose of 600 μg/kg. One of the least labor-intensive treatment protocols involves the topical administration of moxidectin/imidacloprid (Advantage Multi) when used at the standard labeled dose. Treatment is most effective when administered at two-week intervals.

Sarcoptes scabei is highly contagious, and can be transmitted by contact between dogs. Lesions are highly pruritic and are typically found along the ear margins and lateral elbows. The pruritus can be so severe that it can lead to self-mutilation. While more difficult to diagnose on skin scrape then Demodex spp., sarcoptic mange can be easily treated using selamectin (Revolution) and topical moxidectin/imidacloprid (Advantage Multi).

Common clinical signs associated with ear mites (O. cynotis) include ear twitching, scratching, irritation, and thick brown-colored exudate. Products labeled for use in dogs include topical selamectin and moxidectin/imidacloprid. In absence of veterinary products labeled for ear mites, the author recommends an efficacious and cost-effective solution using large animal ivermectin and mineral oil:

- Combine 0.1 ml of 1% ivermectin (Ivomec®) with 9.9 mls of mineral oil.
- Apply one drop AU.
- Repeat in 14 days.

**Tick-Borne Disease (Blood parasites)**

The Companion Animal Parasite Council (CAPC) recommends that dogs should be screened for exposure to ehrlichiosis and anaplasmosis to identify dogs at risk for disease. However, obtaining an accurate diagnosis of current infection involves a combination of clinical signs, positive serology, PCR testing, and hematology. Subclinical infections with Ehrlichia spp. and Anaplasma spp. are common among stray dogs, particularly in those where tick infestation is high.

All E. canis and Anaplasma spp. infections in dogs respond to treatment with doxycycline.

The current recommended treatment regimen is doxycycline orally 10 mg/kg once daily (or 5 mg/kg twice daily) for 28 days.

Recent evidence suggests that this recommended treatment course might not be completely effective at cleaning the organism. Therefore, there is a potential for recrudescence that may warrant re-treatment. The application of effective acaricides is crucial for disease prevention.
Transmissible Venereal Tumor (TVT)

Canine transmissible venereal tumor is a relatively commonly occurring tumor in dogs affected both males and females. TVT is a benign reticulo-endothelial tumor of the dog that mainly affects the external genitalia and occasionally the internal genitalia. It is typically transmitted during coitus. TVT can also be found in extragential locations including the eye and nasal cavity.

Chemotherapy has been demonstrated to be the most practical and effective therapy, with vincristine being the most commonly used drug. Vincristine is typically administered weekly at 0.025 mg/kg IV. Remission typically requires 2 to 8 injections. Because vincristine may cause myelosuppression, a complete white blood cell count is recommended prior to each treatment. If the white blood cell count is below 4,000/ µl, treatment should be delayed 3 to 4 days. Careful attention must be paid to prevent extravasation of the drug when administered IV due to the risk of tissue necrosis.

Be sure to do a cytology (impression smear) of all suspicious lesions prior to adoption.

Cytology of TVT lesion. Note the characteristic cytoplasmic vacuoles.
Local anesthetic blocks

Infiltrative or splash blocks
Uses: Infiltrative blocks are performed prior to an incision to locally desensitize an area for minor surgical procedures. Splash blocks are performed prior to closure of an incisional site to provide local analgesia to the incised tissue.

Practical points:
- Due to its longer length (up to 3.5 inches), use of a 22 g spinal needle is preferred for infiltrative blocks, to cover a longer distance with a single insertion point.

Infiltrative Technique:
1. An infiltrative block involves the subcutaneous distribution of local anesthetic into tissue surrounding a mass or area of incision.

Splash Technique:
1. Splash block involves “splashing” local anesthetic on a site after closure of the muscle layer, but prior to closure of the skin (essentially bathing that area in local anesthetic). Maintaining sterility is important, so the solution is given steriley to the surgeon or splashed steriley into incision without contamination by the anesthetist.

Intratesticular block
Uses: Lidocaine is, and has been, used for field castration for ages, but like many local blocks, has fallen out of favor with the advent of general anesthesia. However, studies examining intratesticular block document significantly lower maximum values for both heart rate and mean arterial pressure for dogs receiving a local intratesticular block. While not statistically significant, it may be clinically significant that only 7 out of 21 dogs in a lidocaine block group required rescue analgesia, and 12 out of 21 dogs in a control group required rescue analgesia.

Practical points
- Lidocaine, not bupivacaine, is suitable for this block due to the high risk of vascular injection.
Some surgeons note that there is a change in the appearance of the testicle, and that it distorts the anticipated anatomy.

In general, the amount of local anesthetic is not dosed by weight but by average size of the animal. After calculating the safe dosage of lidocaine for the patient, to ensure we do not exceed this, we will administer roughly 0.5 mls/testicle in cats and small dogs, and 1.0 ml/testicle in medium to large dogs.

Technique:

1. Grasp the testicle in the non-dominant hand, and insert a 25 g needle attached to a lidocaine syringe into the testicle with the dominant hand.

2. For this block in particular, it is critical to aspirate.

3. Inject the appropriate volume into the testicle.

4. Repeat this procedure on the other testicle.
How to place a ‘tie-over’ bandage

1. Once the wound has been lavaged and debrided, place numerous ‘belt loop’ sutures around the wound approximately 2-3 cm from the edge of the wound. Use larger monofilament nylon suture material; size 0 or 1-0 are good options depending on the size of the patient. The patient must be sedated or under general anesthesia for the sutures to be placed.

2. Place the dressing of choice on the open wound. This may be sugar, honey or a wet-to-dry dressing.

3. Cover the dressing with a number of sterile gauze squares or lap sponges or a combination of both depending on the size of the patient and the wound. A final non-absorbent layer (e.g. drape material) should be placed if possible.

4. Secure the entire bandage to the wound using lacing material such as umbilical tape. Thread the lacing material through the belt loop sutures in a criss-cross pattern. The laces should be pulled snug enough to hold the bandaging material in place without pulling the sutures through the skin.
# Empiric antibiotic treatment of common medical conditions

<table>
<thead>
<tr>
<th>Cat</th>
<th>Dog</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skin Infection (Pyoderma)</strong></td>
<td></td>
</tr>
<tr>
<td>Cefovecin 8mg/kg once</td>
<td>Cefovecin 8mg/kg once</td>
</tr>
<tr>
<td>Doxycycline 5 mg/kg q24h</td>
<td>Cephalixin 22 mg/kg q12h</td>
</tr>
<tr>
<td>Trimethoprim/Sulfonamide 30 mg/kg q24h</td>
<td>Enrofloxacin 5 mg/kg q24h (only if pseudomonas aeruginosa)</td>
</tr>
<tr>
<td>Enrofloxacin 5 mg/kg q24h (only if pseudomonas aeruginosa)</td>
<td></td>
</tr>
<tr>
<td><strong>Urinary Tract Infection (UTI)</strong></td>
<td></td>
</tr>
<tr>
<td>Cefazolin 15 mg/kg q12h</td>
<td>Cefovecin 8mg/kg Once</td>
</tr>
<tr>
<td>Cefovecin 8 mg/kg once</td>
<td>Cefpodoxime 5 mg/kg q24h</td>
</tr>
<tr>
<td>Trimethoprim/Sulfonamide 30 mg/kg q24h</td>
<td>Ceftiofur 2.2 mg/kg q24h</td>
</tr>
<tr>
<td>Enrofloxacin 5 mg/kg q24h (only if pseudomonas aeruginosa)</td>
<td>Trimethoprim/Sulfonamide 30 mg/kg q24h</td>
</tr>
<tr>
<td><strong>Upper Respiratory Infection (URI)</strong></td>
<td></td>
</tr>
<tr>
<td>Doxycycline 10 mg/kg PO q24h</td>
<td>Doxycycline 5 mg/kg q24h</td>
</tr>
<tr>
<td>Enrofloxacin 5 mg/kg q24h (only if pseudomonas aeruginosa)</td>
<td>Enrofloxacin 5 mg/kg q24h (only if pseudomonas aeruginosa)</td>
</tr>
<tr>
<td><strong>Soft Tissue Infection</strong></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin 11 mg/kg q12h</td>
<td>Amoxicillin-clavulanate 13.75 mg/kg q12h</td>
</tr>
<tr>
<td>Amoxicillin-clavulanate 13.75 mg/kg q12h</td>
<td>Cefovecin 8 mg/kg once (not effective against pseudomonas aeruginosa or enterococcus spp.)</td>
</tr>
<tr>
<td>Cefovecin 8 mg/kg once</td>
<td>Enrofloxacin 5 mg/kg q24h</td>
</tr>
<tr>
<td>Enrofloxacin 5 mg/kg q24h (only if pseudomonas aeruginosa)</td>
<td></td>
</tr>
<tr>
<td><strong>Oral/gingival</strong></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin 11 mg/kg q12h</td>
<td>Cefovecin 8 mg/kg once</td>
</tr>
<tr>
<td>Amoxicillin-Clavulanate 13.75 mg/kg q12h</td>
<td>Ceftiofur 2.2 mg/kg q24h</td>
</tr>
<tr>
<td>Cefazolin 15 mg/kg q12h</td>
<td>Cephalixin 22 mg/kg q12h (poor efficacy against enterococcus spp.)</td>
</tr>
<tr>
<td>Cefovecin 8 mg/kg once</td>
<td>Clindamycin 5.5 mg/kg q12h (not effective against Pasteurella multocida or Escherichia coli)</td>
</tr>
<tr>
<td>Enrofloxacin 5 mg/kg q24h</td>
<td>Enrofloxacin 5 mg/kg q24h</td>
</tr>
<tr>
<td><strong>Outer Ear</strong></td>
<td></td>
</tr>
<tr>
<td>Unusual; no established empiric treatment</td>
<td>Cefovecin 8 mg/kg once</td>
</tr>
<tr>
<td></td>
<td>Ceftiofur 2.2 mg/kg q24h</td>
</tr>
<tr>
<td></td>
<td>Enrofloxacin 10 mg/kg q24h (middle/inner ear infections or if pseudomonas aeruginosa)</td>
</tr>
<tr>
<td><strong>Bone</strong></td>
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</tr>
<tr>
<td>Amoxicillin 11 mg/kg q12h</td>
<td>Enrofloxacin 5 mg/kg q24h</td>
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<tr>
<td>Amoxicillin-clavulanate 13.75 mg/kg q12h</td>
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